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A $100 Million U.S. Mistake: Radar Would Jam Satellites

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The National Aeronautics and Space Administration, which had planned to launch two giant satellites in 1980 to communicate with all of its other orbiting craft, has belatedly discovered that because of interference from Russian radar in Europe the satellites will not work.

The space agency is now redesigning the satellites' electronic systems, the engineering model of which had already been built. It now expects the launch to be delayed at least three months, and the extra cost to amount to $100 million.

The tracking and data relay satellite is a giant orbiting transmitter and receiver whose two umbrella-like antennas weigh 50 pounds apiece and unfurl in space to a diameter of 16.5 feet. The satellites are being built to replace 60 percent of the antennas NASA uses on earth at an estimated saving of more than $100 million a year.

NASA's plans call for an eventual total of six of the 5,000-pound satellites, and it awarded a $786 million contract to Western Union to build and operate them.

The electronic interference, which is not deliberate but comes from routine activities of the large Soviet radar installations that ring Eastern Europe, was not identified as a problem until last December, well after the contract had been awarded.

"The people involved did not fully understand the environment and the effects it would have on the system," said C. Curtis Johnson, tracking and data relay satellite project manager at Goddard Space Flight Center. "Otherwise, we would have been more careful in the specifications of the system."

The first satellite was scheduled to be carried into orbit in July 1980 by the space shuttle. The three-month delay is important because NASA wants the satellite to be communicating with the shuttle as shuttle flights increase in 1980. And tracking station contracts NASA has with other countries will be expiring about that time.

White House and Capitol Hill sources said that part of the reason for the belated discovery of the problem is that Pentagon and the Central Intelligence Agency never alerted NASA to the size and scope of the radio interference caused by Soviet radars in the high orbit regions to be occupied by the tracking and data relay satellites.

Sources said this is one reason the White House two weeks ago set up a policy review committte of 16 federal agencies to make sure space project staffs were fully aware of all the issues that might have an impact on them.

Two Senate committees are looking into the reasons for the sudden cost increase in the NASA satellite program. They are the Select Committee on Intelligence and the Commerce Committee, whose subcommittee on science and space is chaired by Sen. Adlai E. Stevenson (D-Ill.).

According to the way the interference has been described by NASA to Congress, the giant Soviet radars from the Baltic to the Black Sea transmit beams that converge high over the Atlantic and Pacific at precisely the same locations NASA wants to put its tracking and data relay satellites.

These are spots 22,400 miles above the earth in what are called geosynchronous orbits, meaning the satellites move around the earth at the same speed the earth rotates. This keeps the satellites "hovering" over the same spot on earth all the time.

NASA could relocate the satellites but they would be useless any place else. What NASA wants the satellites to do is provide complete radio coverage with its orbiting space shuttle and 30 other satellites that are orbiting the earth at lower altitudes.

The tracking satellite is being built to replace obsolete and expensive ground antennas on Ascension Island in the South Atlantic; Quito, Ecuador; Santiago, Chile, and Guam and Hawaii in the Pacific. The satellite could also replace other antennas in Alaska, North Carolina and Bermuda.

The satellite will be a dramatic improvement. It will allow controllers on the ground to "talk" to other satellites and the astronauts in the space shuttle during more than 90 percent of each orbit of the earth. As things are now, satellites in low orbit are out of touch with the ground 80 percent of the time.

What must be redesigned to accommodate the radar interference are the integrated electronic circuits built into the satellite to "process" the endless signals from other satellites in lower orbits. The satellite is designed to accept 300 million "bits" of information every second, the equivalent of 1,200 encyclopedias.

"What we're redesigning are the electronics that unmix all those signals and sort them out before sending them to the ground," Johnson said. "That amounts to 20 percent of the hardware on this satellite."

The way the electronics were originally designed they would be overwhelmed by the Soviet radar signals, at least in part because the electronics would be unable to "recognize" the Russian radar in time to sort it out of the other signals the satellite was receiving.

The space agency estimates the redesign to harden the electronics against the Soviet radar will cost "in the tens of millions of dollars." Capitol Hill sources say the expense will be "at least $100 million."

The contract to build six of the satellites is held by Western Union, which sublet the work to TRW Inc., Harris Electronics Corp. and Watkins-Johnson Co. in Palo Alto, Calif., where most of the electronics design was done.

The $786 million contract signed by NASA with Western Union is a fixed-price contract, meaning that whatever extra costs are incurred in the redesign of the electronics and the spacecraft must be renegotiated.

NASA is considering reducing the number of spacecraft it ordered from six to four. One of the six was to be a spare in orbit, and another was to be "ready" for launch in case one of the in-orbit satellites failed.

Eliminating two production satellites would save $100 million, the estimated cost of the redesign.

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